AMENDMENTS TO THE SPECIFICATION

Please replace the first complete paragraph on page 1 with the following rewritten paragraph:

--The present invention relates to a loudspeaker diaphragm and a method for manufacturing such a diaphragm. More particularly, the present invention relates to a loudspeaker diaphragm ~~having~~ which is light weight and possesses an excellent balance between ~~a~~ rigidity and ~~an~~ internal loss, ~~and~~ as well as a simple and inexpensive method for manufacturing such a diaphragm. --

Please replace the second complete paragraph on page 1 with the following rewritten paragraph:

-- Generally, properties which are required for a loudspeaker diaphragm include a high ~~Young~~ Young's modulus (a high elastic modulus or rigidity) and an appropriate internal loss (tan δ). ~~As~~ A known means ~~that improves a Young~~ for improving Young's modulus, is a diaphragm employing FRP (Fiber Reinforced Plastic) ~~which is~~ , i.e., a composite of a carbon fiber and an epoxy resin ~~is typically exemplified~~, which is a typical example. ~~As~~ A known means ~~that improves~~ for improving an internal loss~~,~~ is typically a diaphragm employing a synthetic resin such as polypropylene ~~is typically exemplified~~. --

Please replace the paragraph bridging pages 1 and 2 with the following rewritten paragraph:

-- The above-mentioned diaphragms respectively have a problem. Specifically, the FRP diaphragm has a high ~~Young~~ Young's modulus. However, since an epoxy resin (a matrix resin of FRP) has a very small internal loss, an internal loss of a diaphragm is small as a whole. As a result, such a diaphragm tends to cause a resonance and therefore has frequency characteristics in which a so-called peak dip appears very much. Accordingly, it is quite difficult to prevent production of sound which is inherent in a diaphragm material. Regarding the synthetic resin diaphragm, in many cases, it has satisfactory frequency characteristics due to its large internal loss. However, the synthetic resin diaphragm has insufficient rigidity and heat resistance. --

Please replace the first complete paragraph on page 2 with the following rewritten paragraph:

-- As means that improves a balance between a rigidity (~~a Young~~ Young's modulus) and an internal loss, a diaphragm employing a polyethylene naphthalate film is proposed in, for example, JP 01-067099 A and JP 06-181598 A. --

Please replace the paragraph bridging pages 3 and 4 with the following rewritten paragraph:

-- According to a technique described in JP 3135482 B, it is extremely difficult to adjust the time at which a foaming is performed and the time at which the clamping force and ~~a~~ mold clearance ~~are~~ is varied. As a result, it is difficult to stably obtain a diaphragm having a satisfactory balance between mechanical strength and weight. According to a technique described in JP 11-080408 A, since a resin molded product (e.g., a sheet) is impregnated with gas, it ~~spends very much~~ requires an excessive amount of time to be sufficiently impregnated with the gas. For example, in the case where a resin having high crystallinity is used for improving mechanical strength, it may take 100 hours or more for gas impregnation. Therefore, this technique is not at all commercially practicable ~~at all~~. --

Please replace the first complete paragraph on page 4 with the following rewritten paragraph:

-- As ~~described~~ mentioned above, a loudspeaker diaphragm ~~having~~ which is light weight and ~~an~~ possesses excellent balance between ~~a~~ rigidity and ~~an~~ internal loss in ~~any~~ a variety of uses (i.e., regardless of ~~a~~ the diameter of a resultant loudspeaker), ~~and~~ coupled with a simple and inexpensive method for manufacturing such a diaphragm ~~have~~ has been ~~eagerly demanded~~in great demand. --

Please replace the second complete paragraph on page 4 with the following rewritten paragraph:

-- The present invention ~~has been made for solving~~ is intended to solve the above-mentioned problems. ~~Therefore, it is an object of~~ Accordingly, the present invention ~~to provide~~ provides a loudspeaker diaphragm having light weight and excellent balance between ~~a~~ rigidity and ~~an~~ internal loss in any uses, ~~and~~ as well as a simple and inexpensive method for manufacturing such a diaphragm. --

Please replace the section heading beginning after the third complete paragraph on page 10 with the following rewritten section heading:

-- ~~DESCRIPTION OF THE PREFERRED EMBODIMENTS~~DETAILED DESCRIPTION OF THE INVENTION --

Please replace the paragraph bridging pages 14 and 15 with the following rewritten paragraph:

-- A ratio of a fiber to a resin (a fiber/resin ratio) in the base layer 1 is preferably in the range of 60/40 to 80/20 and more preferably in the range of 70/30 to 80/20. By using a base layer having a high fiber/resin ratio, a loudspeaker diaphragm having an excellent internal loss can be obtained without deteriorating ~~a Young~~ the Young's modulus. Here, the term "fiber/resin ratio means a ratio ~~of~~ by weight of ~~a~~ the weight of a woven fabric before impregnation to the weight of an impregnating resin. As described above, such extremely high fiber/resin ~~ratio~~ ratios can be realized by using an untwisted fiber as a fiber constituting a base layer (i.e., a PEN fiber in the present invention). --

Please replace the first complete paragraph on page 15 with the following rewritten paragraph:

-- A loudspeaker diaphragm according to the present invention may optionally include a thermoplastic resin layer 2. By providing a thermoplastic resin layer 2, it is possible to prevent production of inherent sound which tends to be produced in the case where a base layer is formed alone. As a result, a loudspeaker diaphragm having frequency characteristics containing no peak dip can be obtained. The thermoplastic resin layer 2 may be a woven fabric, an unwoven fabric or a film. For example, in the case where a loudspeaker diaphragm according to the present invention has a two-layer structure including a base layer 1 and a thermoplastic resin layer 2 or where a thermoplastic resin layer 2 is an intermediate layer as shown in Fig. 1, the thermoplastic resin layer 2 is preferably a film. Since the resin constituting the thermoplastic resin layer 2 would easily flow into a space of the base layer 1 at the time when molding is performed, wettability of the surface of the PEN fiber constituting the base layer 1 can be improved. As a result, a loudspeaker diaphragm having an excellent ~~Young~~ Young's modulus (rigidity) can be obtained. In contrast, in the case where a thermoplastic resin layer 2 is the innermost layer of a three-layer structure, the thermoplastic resin layer 2 is preferably a woven fabric or an unwoven fabric. This is

because a resin of an intermediate layer would easily flow into a space of the thermoplastic layer 2. --

Please replace the paragraph bridging pages 17 and 18 with the following rewritten paragraph:

-- A process for producing the above-mentioned finely foamed structure (in the present embodiment, a process for producing a foamed sheet) is as follows. Initially, a resin sheet is placed in a high pressure container at room temperature. Then, high pressure inactive gas is sufficiently dissolved to the extent that a saturated state is produced in the container. Typical examples of the inactive gas include nitrogen, carbon dioxide, argon, neon, helium, oxygen and mixed gas thereof. Nitrogen and carbon dioxide are preferred because they are inexpensive and easy to handle. Then, gas pressure in the high pressure container is suddenly reduced while the temperature therein ~~being~~ is kept at room temperature, so as to produce a supersaturated state of the gas in the resin sheet. At that time, the sheet becomes thermodynamically extremely unstable so that a core of a cell is produced. The sheet is heated to a temperature higher than the softening temperature of the sheet so that the cell ~~is grown~~expands/grows. Thereafter, the sheet is cooled to obtain a foamed sheet. Alternatively, a resin sheet is placed in a high pressure container at high temperature. Then, high pressure inactive gas is sufficiently dissolved under a high temperature and high pressure condition to the extent that a saturated state is produced in the container. Then, the gas is suddenly removed so that supersaturation of the gas, production of a core of a cell and growth of the cell ~~are~~ simultaneously ~~made~~ progress. Thereafter, the sheet is cooled to obtain a foamed sheet. --

Please replace the paragraph bridging pages 18 and 19 with the following rewritten paragraph:

-- Alternatively, as shown in Fig. 2, the finely foamed structure can be formed simultaneously with a sheet molding by use of an extruder. More specifically, a thermoplastic resin 20 as a raw material is charged into an extruder 22 through a hopper 21 and is molten in the extruder 22 typically at a temperature of 180 to 220°C. Then, inactive gas (typically, nitrogen, carbon dioxide, argon, neon, helium, oxygen or mixed gas thereof) in a supercritical state is added thereto at a prescribed amount (typically, 10 to 30 parts by weight based on 100 parts by weight of the resin) through the middle portion 23 of the

extruder. Here, reference numeral 24 denotes inactive gas in a liquid state and reference numeral 25 denotes a SCF (Supercritical Fluid) system that produces a supercritical state. Then, the molten thermoplastic resin and the inactive gas are kneaded while the pressure of the inactive gas (a foaming gas) in the extruder ~~being~~ is kept at a critical pressure or higher. By keeping the inactive gas in a supercritical state, the inactive gas is incorporated and dispersed into the molten thermoplastic resin in an extremely short time so that an excellent compatible state can be realized. This is because viscosity in a supercritical state is lower than that in a liquid state and a diffusion property in a supercritical state is much higher than that in a liquid state. The mixture of the molten thermoplastic resin and the inactive gas is fed to a sheet molding die 26 being controlled at prescribed temperature (typically, 130 to 150°C) so that a foamed sheet 27 is obtained. Such a foamed sheet (a thermoplastic resin layer 2) and a PEN woven fabric (a base layer 1) are laminated to obtain a diaphragm according to the present invention. In the present specification, the term "supercritical state" means a state ~~having~~ wherein the gas is at a critical temperature or ~~more~~ greater and is at a critical pressure or ~~more~~greater. Regarding nitrogen gas, the critical temperature is -127°C and the critical pressure is 3.5 MPa. Regarding carbon dioxide gas, the critical temperature is 31°C and the critical pressure is 7.4 MPa. --

Please replace the paragraph bridging pages 19 and 20 with the following rewritten paragraph:

-- Also in the case where a thermoplastic resin layer 2 has a finely foamed structure, the ~~afore-mentioned~~ aforementioned thermoplastic resin can be preferably used. In this case, an especially preferred resin is polyolefin. This is because a satisfactorily finely foamed structure can be obtained. --

Please replace the first complete paragraph on page 20 with the following rewritten paragraph:

-- A loudspeaker diaphragm according to the present invention may optionally include a thermoplastic elastomer layer 3. The thermoplastic elastomer layer 3 may be a woven fabric, an unwoven fabric or a film. For example, as shown in Fig. 1, in the case where a thermoplastic elastomer layer 3 is the innermost layer, the thermoplastic elastomer layer 3 is preferably a woven fabric or an unwoven fabric. This is because a resin constituting a thermoplastic resin layer 2 would easily flow into a space of the thermoplastic

elastomer layer 3 at the time when molding is performed. As a result, since wettability of the surface of the PEN fiber can be improved, a loudspeaker diaphragm having an excellent ~~Young~~ Young's modulus (rigidity) can be obtained. In contrast, in the case where a thermoplastic elastomer layer 3 is an intermediate layer, the thermoplastic elastomer layer 3 is preferably a film. The thermoplastic elastomer would easily flow into a base layer 1 and/or a thermoplastic resin layer 2. --

Please replace the paragraph bridging pages 23 and 24 with the following rewritten paragraph:

-- According to the present invention, a loudspeaker diaphragm having a base layer including a woven fabric of a polyethylene naphthalate (PEN) fiber impregnated with a thermosetting resin is provided. Such a loudspeaker diaphragm has an excellent balance between a ~~Young~~ Young's modulus and an internal loss. The details are as follows. If a woven fabric is used for a base layer, respective fibers constituting the base layer would easily slip when a diaphragm is vibrated. As a result, vibration energy is converted into heat energy so that an internal loss would become large. Furthermore, since a PEN woven fabric used in the present invention has an extremely large weave density, there exists a small amount of a thermosetting resin as a binder resin between fibers constituting the woven fabric in the resultant diaphragm. As a result, a laminated structure having a woven fabric layer and a resin layer is substantially formed in the base layer and such a structure contributes to further improvement of an internal loss. In addition, due to the extremely large weave density of the PEN woven fabric, ~~a Young~~ the Young's modulus can be satisfactorily maintained. Accordingly, a loudspeaker diaphragm simultaneously ~~satisfying~~ possessing an excellent ~~Young~~ Young's modulus and internal loss, which could not be obtained by prior art, can now be realized. --

Please replace the first complete paragraph on page 28 with the following rewritten paragraph:

-- Density, weight, ~~a Young~~ Young's modulus and ~~an~~ internal loss (tan δ) were measured in accordance with a conventional method with regard to the thus-obtained diaphragm. The results of the ~~measurement~~ measurements together with those of Examples 2 and 3 and Comparative Example 1 (described later) are shown in Table 1 as indicated below. Furthermore, frequency characteristics of a loudspeaker employing the thus-obtained

diaphragm were measured. The results are shown in Fig. 3. In addition, the fiber/resin ratio of the diaphragm in Example 1 was 78/22 --

Please replace the Table 1 on page 28 with the following rewritten Table 1:

Table 1

	Density (g/cm3)	Weight (g)	~~Young~~Young's modulus (dyne/cm^2)	Specific elasticity (dyne·cm/g)	Internal loss (tan δ)
Example 1	1.01	2.30	3.44×10^{10}	3.41×10^{10}	0.45
Example 2	1.05	2.30	4.50×10^{10}	4.29×10^{10}	0.47
Example 3	1.01	2.30	5.20×10^{10}	5.15×10^{10}	0.45
Comparative Example 1	1.20	2.40	3.20×10^{10}	2.67×10^{10}	0.22

Please replace the paragraph bridging pages 30 and 31 with the following rewritten paragraph:

-- As is apparent from Table 1, loudspeaker diaphragms according to examples of the present invention respectively have a superior ~~Young~~ Young's modulus and internal loss. Especially, the diaphragm in Example 3 in which the PEN fiber is coated with a second thermosetting resin (a melamine resin) has ~~Young~~ a Young's modulus and internal loss both of approximately two times as much as those of the diaphragm in Comparative Example 3. Also, as is apparent from Table 2, wettability of the diaphragm in Example 3 is remarkably improved compared to that of the diaphragm in Example 1. However, attention should be given that properties of the diaphragm in Example 1 are much superior to those of a prior art diaphragm. --

Please replace the first complete paragraph on page 31 with the following rewritten paragraph:

-- As is apparent from Fig. 7B, a base layer of a diaphragm according to the present invention substantially forms a three-layer structure including a resin layer, a PEN woven fabric layer, and a cotton fabric and resin layer. In contrast, according to the diaphragm in Comparative Example 1, shown in Fig. 7A, a binder resin is incorporated into a space between the fibers constituting the woven fabric. It is conceivable that a loudspeaker diaphragm according to the present invention has a superior internal loss due to a substantially laminated structure of the base layer and that the diaphragm has a superior

~~Young~~ Young's modulus due to extremely large weave density of the PEN fiber and existence of an appropriate amount of the binder resin in the vicinity of the PEN fiber. --

Please replace the first complete paragraph on page 33 with the following rewritten paragraph:

-- Density, weight, ~~a Young~~ Young's modulus and ~~an~~ internal loss were measured in accordance with a conventional method with regard to the thus-obtained diaphragm. The results of the ~~measurement~~ measurements together with those of Examples 5 and 6 and Comparative Example 2 (described later) are shown in Table 3 as indicated below. Furthermore, the frequency characteristics of a loudspeaker employing the thus-obtained diaphragm of Example 4 were measured~~. The results~~ and are shown in Fig. 8. --

Please replace the second complete paragraph on page 34 with the following rewritten paragraph:

-- The thus-obtained diaphragm was subjected to the same measurement as Example 4. The results are shown in the above-mentioned Table 3. Furthermore, the frequency characteristics of a loudspeaker employing the thus-obtained diaphragm of Comparative Example 2 were measured~~. The results~~ and are shown in Fig. 9. --

Please replace the first complete paragraph on page 35 with the following rewritten paragraph:

-- A loudspeaker diaphragm was manufactured in the same manner as Example 4 except that the foamed sheet was used as a thermoplastic resin layer. The thus-obtained diaphragm was subjected to the same measurement as Example 4. The results are shown in the above-mentioned Table 3. Furthermore, the frequency characteristics of a loudspeaker employing the thus-obtained diaphragm of Example 5 were measured~~. The results~~ and are shown in Fig. 10. --

Please replace the paragraph bridging pages 35 and 36 with the following rewritten paragraph:

-- As is apparent from Table 3, loudspeaker diaphragms according to examples of the present invention respectively have low density (light weight) and an excellent balance between ~~a Young~~ Young's modulus (rigidity) and ~~an~~ internal loss. --